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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/879,905	06/14/2001	Yasuhiro Shimada	35.C15451	5559

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FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER

YAM, STEPHEN K

ART UNIT	PAPER NUMBER
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2878

DATE MAILED: 06/25/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/879,905

Applicant(s)

SHIMADA ET AL.

Examiner

Stephen Yam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Specification

1. On line 18 of page 1, the term "conductor" is misspelled as "coductor".
2. On line 24 of page 4, the term "probes" is misspelled as "proves".
3. On line 2 of page 2, the term "micro-tip" is misspelled as "micrio-tip".
4. On line 1 of 6, the term "opening" is misspelled as "opeining".
5. On line 5 of 6, the term "surface" is misspelled as "serface".
6. On line 27 of 15, the term "apparatus" is misspelled as "apparatur".

Claim Objections

7. Claims 17-19 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n). Accordingly, the claims 17-19 not been further treated on the merits.
8. On line 26 of page 37, the term "opening" in Claim 10 is misspelled as "opeining".
9. On line 4 of page 39, the term "hollow" is misspelled as "follow".

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 9 and 17-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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In Claim 9, there is insufficient antecedent basis for the limitation "said mirror".

In Claims 17-19, the dependencies of the claims are invalid- therefore, the scope of the claims is not properly defined. The metes and bounds of the claims are unclear, and should be specifically defined using proper dependencies.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

- (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
- (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

13. Claims 1, 6, and 8-9 are rejected under 35 U.S.C. 102(e) as being unpatentable by Yamamoto et al. US Patent No. 6,396,050.

Regarding Claim 1, Yamamoto et al. teach a probe comprising a cantilever (See Fig. 7, ref. 15) supported by a substrate (10) (see Fig. 7), a hollow tip (see Fig. 6B), a microaperture (see Col. 2, lines 66-67), and a hollow waveguide (see Col. 2, lines 15-16).

Regarding Claim 6, Yamamoto et al. teach the tip being substantially perpendicular to the longitudinal direction of the cantilever (see Fig. 6B).

Regarding Claims 8 and 9, Yamamoto et al. teach a concave mirror (8) (see Fig. 3) inside the probe to guide light from the waveguide to the microaperture.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al.

Yamamoto et al. teach a probe comprising a cantilever, hollow tip, microaperture, and hollow waveguide. Yamamoto et al. do not teach the waveguide containing a V-shaped transversal cross section, or a trapezoidal cross section, or a U-shaped transversal cross section. It would have been obvious to one of ordinary skill in the art at the time the invention was made to construct the waveguide with a V-shaped, trapezoidal, or U-shaped transversal cross section, as such a decision is a matter of design choice and provides no substantial functional improvement.

16. Claims 5, 7, 10-14, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quate US Patent No. 5,354,985 in view of Yamamoto et al.

Regarding Claims 5 and 7, Quate teaches a probe comprising a cantilever (see Fig. 1B) composed of silicon (see Col. 3, line 12), square hollow tip (see Fig. 6D), microaperture (see Abstract, line 5), and waveguide (23). Quate does not teach a hollow waveguide for the cantilever. Yamamoto et al. teach a probe comprising a cantilever, hollow tip, microaperture,

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and hollow waveguide. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the probe of Quate with the hollow waveguide of Yamamoto et al., to provide less optical loss through the waveguide.

Regarding Claims 10-13, Quate teaches a probe comprising a cantilever (see Fig. 1B), hollow tip (see Fig. 6D), microaperture (see Abstract, line 5), and waveguide (23). Quate also teaches the formation of a hollow tip (Fig. 4A-4M) and the removal of a part of a substrate by etching to form a cantilever (Fig. 4L) for an optical probe. Regarding Claim 12, Quate further teaches the use of crystal-anisotropic etching (see Col. 8, lines 31-35) to etch the substrate of a cantilever probe. Quate does not teach the construction of the probe by working a substrate to form a groove therein and forming a flat plate-shaped covered portion on the groove. Yamamoto et al. teach a probe comprising a cantilever, hollow tip, microaperture, and hollow waveguide. Regarding Claim 13, Yamamoto et al. also teach a surface treatment step to form a mirror surface state (see Col. 2, lines 64-65 and Col. 3, lines 12-18). Yamamoto et al. and Quate do not teach the working of a substrate to form a groove and forming a flat plate-shaped cover portion on the groove to form a hollow waveguide. It would have been obvious to one of ordinary skill in the art at the time the invention was made to produce the probe of Quate with the hollow waveguide of Yamamoto et al. by working a substrate to form a groove, forming a flat plate-shaped cover portion on the groove to form a hollow waveguide, forming a hollow tip having a microaperture, and removing a part of the substrate by etching to form a cantilever, as forming a hollow waveguide from a substrate would require etching methods to define the waveguide and construction of a cover portion to confine the guided light, to form a hollow waveguide within the cantilever to reduce optical loss.

Regarding Claim 14, Quate teaches a probe comprising a cantilever (see Fig. 1B), hollow tip (see Fig. 6D), microaperture (see Abstract, line 5), and waveguide (23). Quate also teaches the use of a silicon-on-insulator (SOI) wafer as a substrate (see Col. 5, lines 55-58) and the etching of the SOI layer (see Col. 6, lines 12-13). Quate does not teach a hollow waveguide for the cantilever. Yamamoto et al. teach a probe comprising a cantilever, hollow tip, microaperture, and hollow waveguide. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a cover portion from an SOI layer of the SOI substrate of Quate to create the hollow waveguide of Yamamoto et al, to provide a simplified fabrication process for producing the optical probe and specifically, the cantilever and groove, to provide a waveguide with minimal optical loss.

Regarding Claim 16, Quate teaches a probe comprising a cantilever (see Fig. 1B), hollow tip (see Fig. 6D), microaperture (see Abstract, line 5), and waveguide (23). Quate also teaches the formation of a hollow tip (Fig. 4A-4M) and the removal of a part of a substrate by etching to form a cantilever (Fig. 4L) for an optical probe. Quate does not teach the construction of the probe by working a substrate to form a groove therein and forming a flat plate-shaped covered portion on the groove. Yamamoto et al. teach a probe comprising a cantilever, hollow tip, microaperture, and hollow waveguide. Quate and Yamamoto et al. do not teach the specific process of forming a film of tip material on a recess, transferring the tip material onto the opening, and etching the end of the tip to form the microaperture. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to create the tip and microaperture in the modified probe of Quate by forming the material into a tip form and etching

the microaperture, as such a procedure is common knowledge in the art of cantilevers and producing a tip using such a method is well known in the art.

17. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Quate in view of Yamamoto et al., further in view of Tsukamoto et al. US Patent No. 5,902,715.

Quate teaches a probe comprising a cantilever (see Fig. 1B), hollow tip (see Fig. 6D), microaperture (see Abstract, line 5), and waveguide (23). Quate also teaches the formation of a hollow tip (Fig. 4A-4M) and the removal of a part of a substrate by etching to form a cantilever (Fig. 4L) for an optical probe. Quate does not teach the construction of the probe by working a substrate to form a groove therein and forming a flat plate-shaped covered portion on the groove. Yamamoto et al. teach a probe comprising a cantilever, hollow tip, microaperture, and hollow waveguide. Yamamoto et al. also teach a forming of a metal film on the outer surface of the probe (see Col. 2, lines 64-65 and Col. 3, lines 12-18). Quate and Yamamoto et al. do not teach a cover portion formed by filling the groove with a resin layer. Tsukamoto et al. teach an optical waveguide with a surrounding cover portion formed by filling a groove with a resin layer (see Col. 50, lines 63-65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to construct the waveguide of Quate in view of Yamamoto et al. using a photosensitive resin layer, as taught by Tsukamoto et al., to create the cover portion, so that the cover portion will effectively remain covering a majority of the groove, without requiring a complex etching method to retain the cover portion.

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Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


Laakmann, US Patent No. 4,688,893, teach a hollow waveguide having different shaped transversal cross sections.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Yam whose telephone number is (703)306-3441. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (703)308-4881. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7724 for regular communications and (703)308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

SY
June 12, 2002


Kevin Pyo
Primary Examiner